Abstract

Name of the thesis

Effect of nitric oxide on cerebral blood flow during neuronal activity

Aim of the thesis

The aim of this thesis is to determine whether the application of 7-nitroindazole, relatively specific inhibitor of neuronal nitric oxide synthase, affects the baseline blood pressure. Furthermore, to determine whether the application of the substance affects the baseline cerebral blood flow and whether it influences blood flow in brain during transcallosal stimulation with increasing frequency.

Research method

The research took place at the premises of the Institute of Physiology, Academy of Sciences of the Czech Republic. Experiments were carried out on laboratory albino Wistar rats. The group contained both experimental and control sample. General anesthesia was performed to rats, stimulating and sensing electrodes were implanted in epidural area of sensorimotor cortex and Laser Doppler flow probe was implanted into the contralateral hemisphere. A plastic catheter was applied in the carotid artery for measuring systemic blood pressure. In the first part of the experiment, we tested the effects of 7-nitroindazole on the systemic blood pressure. In the second part of the experiment, we investigated the effects of 7-nitroindazole on baseline cerebral blood flow. The third part of the experiment was to clarify the effects of transcallosal stimulation of the frequency of 3, 5, 10 and 15 Hz on cerebral blood flow before and after application of 7-nitroindazole.

Results

Application of 7-nitroindazole decreased baseline cerebral blood flow without affecting systemic blood pressure. The transcallosal stimulation increased baseline CBF, the response was reduced after the application of 7-nitroindazole.

Conclusion

The resulting data suggest that 7-nitroindazole reduces regional cerebral blood flow without affecting systemic blood pressure.

Key words

Regional cerebral blood flow (rCBF), nitric oxide (NO), nitric oxide synthase (NOS), neurovascular link, 7-nitroindazole (7-NI)